

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Peter J. Milner

Application No.: 10/579,183

Confirmation No.: 1542

Filed: June 8, 2006

Art Unit: 3655

For: CONTINUOUSLY VARIABLE
TRANSMISSION DEVICE

Examiner: Roger L. Pang

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Responsive to the final Office Action mailed November 18, 2008, Applicant appeals from the final rejection of the claims in this case. Attached hereto is Applicant's notice of appeal dated February 17, 2009. Applicant further avers as follows:

I. REAL PARTY IN INTEREST

The real party in interest is Orbital Traction Ltd., 100D Leicester Road, Hinckley, Leicestershire LE10 1LU, United Kingdom.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 1, 2 and 4-10 are pending in this application. Claims 1, 2 and 4-10 have been finally rejected. Claim 3 has been canceled.

Applicant appeals from the Examiner's final rejection of claims 1, 2 and 4-10 in this application.

IV. STATUS OF AMENDMENTS

All amendments that have been filed have been entered in this case.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter is as follows:

Claim 1

A continuously variable transmission device of the type having planets (23) in rolling contact with radially inner (36, 37) and outer (12, 14) races each comprising axially spaced relatively axially movable parts,

Support for the foregoing is found on page 6, lines 19-24 and page 8, lines 13-16.

and control means for determining the axial separation of the parts of one of the two races,

This is a "means for" limitation finding support on page 7, lines 4-8 and 16-22. The control means specifically includes the Oldham coupling, actuator 10 and ball screws 15.

in which the planets (23) are connected for drive transmission to an input (30) or output (29) member of the transmission device by connection means (27) which allows the radial position of the planets (23) to vary in response to variation in the axial separation of the parts of the said one of the two races,

Support is found on page 8, lines 4-7 and 19-23 and page 9, lines 1-19.

and in which a generatrix of a curved rolling contact surface of the races and the planets (23) is non-circular and in which the curved

rolling contact surface of the races and the planets is a volute, involute or evolute curve.

Support for the foregoing is found on page 10, line 23 – page 11, line 9 and page 12, lines 18-21.

The major difference between the continuously variable transmission device of the present invention and that shown by the prior art, the most pertinent of which comprises prior art of the same inventor, is that the generatrix of the rolling contact surface between the races and the planet is non-circular. As discussed more fully below, that is not true for the prior art devices.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Patent Examiner has rejected claims 1, 2 and 4-10 in this application, i.e. all of the claims that have not been withdrawn or canceled, as anticipated under 35 U.S.C. §102 by WO 03/023256 to Milner (Milner '256).

VII. ARGUMENT

For the reasons set forth below, Applicant respectfully submits that the Patent Examiner's rejection of claims 1, 2 and 4-10 in this application as anticipated by Milner '256 should be reversed by this Board.

The Milner '256 reference, which has the same inventor as this case, discloses a continuously variable transmission device which, like the present invention, uses a two-part planet to transmit the rotation from the input and to the output. Consequently, the Milner '256 is clearly pertinent to the present invention.

Unlike the present invention, however, each of the embodiments shown in the figures of the Milner '256 patent and described in the specification only shows circular generatrix races and

planets. That is, if the generatrix of the rolling surface of any of these races and planets were extrapolated, the resultant shape would always be circular.

As is clear from the figures of Milner '256 (see, for example, FIGS. 4 and 5 of Milner '256), the races and planets are not complete spheres. Instead, the races and planets are sections of spheres. Specifically, in the embodiment shown in FIGS. 1 and 3 of Milner '256, these sections are taken from the "equatorial" regions of the sphere while in FIGS. 4 and onwards the sections are taken from the "polar" regions.

Page 6, lines 3-24 discusses this aspect of Milner '256 in great detail. From this portion of Milner '256, it is clear that the races and planets are sections of spheres and describes these arrangements as being "prolate" and "oblate" spheroids; see page 6, line 10. Such prolate and oblate spheroids are always spherical.

As is also clear from FIGS. 4 and onwards, the overall structure of the races and the planets need not be spherical. Rather, only the rolling surfaces need to be spherical, i.e. the parts of those races and planets which actually contact each other. The remainder of the structure is often other than spherical for engineering or other reasons.

For example, page 5, lines 18-20 of Milner '256 describes that the surface of the planet need not be part of a circle nor, indeed, does it even have to be spherical or even a regular curve. However, regardless of the precise shape of the races and planets of Milner '256, the generatrix of the rolling contact between the planets and the races is always circular.

In sharp contrast to Milner '256, claim 1 of the present invention clearly defines the generatrix of the rolling contact between the races and the planets as non-circular.

Since the Milner '256 reference only discloses a continuously variable transmission in which the generatrix between the races and the rolling planets is circular, and since claim 1, and

therefore all of the claims, clearly define the generatrix as non-circular, the Patent Examiner's rejection under 35 U.S.C. §102 cannot be sustained. It is fundamental that, for a prior art reference to anticipate a claim, that prior art reference must show each and every claimed element. That simply is not the case in this application.

Furthermore, Applicant respectfully submits that the Patent Examiner has read more into the Milner '256 reference than exists in Milner '256. For example, the Patent Examiner in his Office Action correctly states that page 5, lines 18-20 of Milner '256 states that the generatrix need not be part of a circle or even a regular curve. This, however, is entirely consistent with the embodiments of Milner '256 where the overall structure has flat portions or discontinuities. However, each and every embodiment of Milner '256 teaches nothing other than a rolling contact surface of a race or planet that is spherical, and therefore circular, in shape.

Similarly, the Patent Examiner has also taken the position that page 12 of Milner '256 discloses prolate or oblate spheroids. However, such prolate or oblate spheroids are always sections of a sphere and, indeed, Milner '256 defines such prolate or oblate spheroids as such.

Applicant further respectfully submits that the Patent Examiner has misunderstood a portion of the present invention. Specifically, in the Patent Examiner's final Office Action, the Patent Examiner argues that if the planets are of one shape, i.e. circular or non-circular, then the races must have the same shape, i.e. circular or non-circular. However, that is simply not the case.

Rather, Milner '256 merely discloses on page 4, lines 20-25, that the shapes of the planets and races should correspond or be complementary to one another. For example, if one surface is convex, the other should be concave. However, it is not always the case that if a convex non-circular planet is used, a concave non-circular race must be used. Indeed, page 4, line 21 of

Milner '256 clearly discloses that the shapes of the races and the planets do not have to match which is contrary to the position taken by the Patent Examiner in his final rejection of the claims in this case. Rather, it is enough for the planets and races to simply correspond or complement to each other, e.g. one may be convex and the other may be concave. Thus, it is certainly not necessary that the planets and races have matching shapes.

Furthermore, nowhere in Milner '256 does Milner '256 suggest that the generatrix be volute, evolute or involute in shape.

For all the foregoing reasons, Applicant respectfully submits that the Patent Examiner's rejection of all of the pending claims in this application as anticipated under 35 U.S.C. §102 is in error and should be reversed.

Even though the Patent Examiner has not rejected the claims in this application as unpatentably obvious under 35 U.S.C. §103, it is also clear that the present invention, as defined in the currently pending claims, would not be obvious in view of Milner '256, or any of the other prior art references.

More specifically, the provision of the generatrix of the contact surface between the planets and races be non-circular enables the efficiency of the device to be controlled across a wide range of transmission ratios. The prior art, including Milner '256, did not even recognize this problem, let alone provide a solution to it. Since the prior art does not even recognize the problem of controlling efficiency, there is no motivation to solve that problem. However, in the instant application, Applicant has not only recognized the problem, but provided the solution.

Claims 2 and 4-10 all depend from claim 1. Consequently, the above arguments are equally applicable to those claims.

For all the foregoing reasons, Applicant respectfully submits that the Patent Examiner's final rejection of claims 1, 2 and 4-10 is in error and should be reversed. Such action is respectfully solicited.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A include all the amendments filed by Appellant.

IX. EVIDENCE

The evidence involved in the present appeal is listed in attached Appendix B.

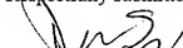
X. RELATED PROCEEDINGS

The related proceedings involved in the present appeal are listed in attached Appendix C.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 07-1180.

Dated: 4-17-2009

Respectfully submitted,


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APPENDIX A

1. A continuously variable transmission device of the type having planets in rolling contact with radially inner and outer races each comprising axially spaced relatively axially movable parts, and control means for determining the axial separation of the parts of one of the two races, in which the planets are connected for drive transmission to an input or output member of the transmission device by connection means which allows the radial position of the planets to vary in response to variation in the axial separation of the parts of the said one of the two races, and in which a generatrix of a curved rolling contact surface of the races and the planets is non-circular and in which the curved rolling contact surface of the races and the planets is a volute, involute or evolute curve.
2. A continuously variable transmission device according to Claim 1, in which at least part of the generatrix of the curved rolling contact surface of at least one of the races and/or the planets is discontinuous.
4. A continuously variable transmission device according to Claim 1, in which at least one part of the generatrix of the curved rolling contact surface of the races and the planets is more sharply curved than at least one other part.
5. A continuously variable transmission device according to Claim 1, in which the said control means include two adjustment members interengaged by helical interengagement

means such that relative turning motion of one of the adjustment members results in relative axial displacement between the two adjustment members.

6. A continuously variable transmission device according to Claim 1, in which the connection means between the planets and a planet carrier comprises a connector plate having a plurality of slots, having at least a radial component, within each of which a part of a respective planet is engaged.

7. A continuously variable transmission device according to Claim 6, in which the said slots are inclined to a radial line passing through the slot in such a way as in use to apply or have applied thereto a force having both a radial and a circumferential component.

8. A continuously variable transmission device according to Claim 1, in which the said radially inner and outer races are located within a fixed housing and one or other of the said races is rotatable with respect to the housing by the input or output shaft of the transmission device.

9. A rolling contact continuously variable transmission device according to Claim 1, characterised by having a fixed ratio epicyclic gear in the drive train to its output drive member and/or from its input drive member.

10. A continuously variable transmission device according to Claim 1 in which the two parts of the radially outer race and/or the radially inner race are interconnected by means of a helical coupling, with rolling elements between the two parts to reduce friction.

APPENDIX B

None

APPENDIX C

None